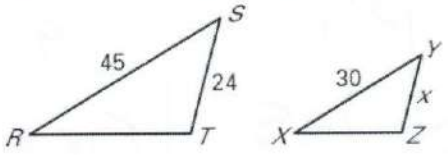
Geometry Per/Date: _____

6.3 Use Similar Polygons

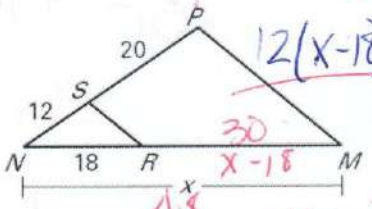
Warm Up:

1. In the diagram, $\frac{RS}{XY} = \frac{ST}{YZ}$. Write four true proportions.



2. In the diagram, $\frac{MR}{RN} = \frac{PS}{SN}$.

Find MN and MR.



3. On a map, a street is 2 inches long. The actual length is 1 mile. Find the scale.

4. A map is scaled so that 1 cm represents 20 km. If two towns are 8.2 centimeters apart on the map, what is the actual distance between the towns?

Assignment Check:
pp. 360-361; problems 3-55 eoo
pp. 367-368; problems, 3-18 all

Objective: Use proportions to identify similar polygons

Standard:
5.0 Students prove that triangles are congruent or similar, and they are able to use the concept of corresponding parts of congruent triangles.

11.0 Students determine how changes in dimensions affect the perimeter, area, and volume of common geometric figures and solids.

Vocabulary:

Similar polygons:
Two polygons are similar polygons if corresponding angles are congruent and corresponding side lengths are proportional.

Scale factor of two similar polygons:
If two polygons are similar, then the ratio of the lengths of two corresponding sides is called the scale factor.

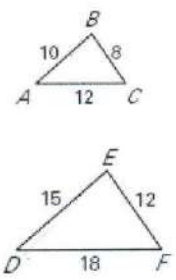
Ex 1: Use similarity statements

In the diagram, $\Delta ABC \sim \Delta DEF$.

Similar

$\cong$ - Congruent

$\sim$ - Similar



a) $\angle A \cong \angle D$
$\angle C \cong \angle F$
$\angle B \cong \angle E$

a. List all pairs of congruent angles.
b. Check that the ratios of corresponding side lengths are equal.
c. Write the ratios of the corresponding side lengths in a *statement of proportionality.*

b) $\frac{BC}{EF} = \frac{8}{12} = \frac{2}{3}$

$\frac{AB}{DE} = \frac{10}{15} = \frac{2}{3}$

$\frac{AC}{DF} = \frac{12}{18} = \frac{2}{3}$

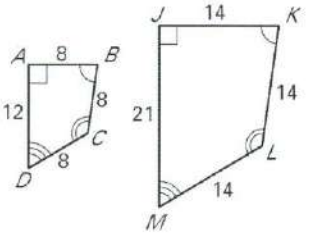
$\frac{2}{3}$; 2:3

Scale factor

c) $\frac{BC}{EF} = \frac{AB}{DE} = \frac{AC}{DF}$

Ex 2: Find the scale factor

Determine whether the polygons are similar. If they are, write a similarity statement and find the scale factor of *ABCD* to *JKLM*.



$ABCD \sim JKLM$

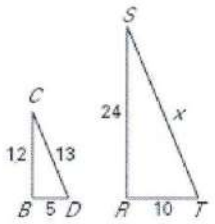
Scale factor $\frac{4}{7}$ 4:7

$\frac{AD}{JM} = \frac{12}{21} = \frac{4}{7}$ $\frac{AB}{JK} = \frac{8}{14} = \frac{4}{7}$ $\frac{BC}{KL} = \frac{8}{14} = \frac{4}{7}$

$\frac{DC}{ML} = \frac{8}{14} = \frac{4}{7}$

Ex 3: Use similar polygons

In the diagram, $\Delta BCD \sim \Delta RST$. Find the value of *x*.



$x = 26$

$\frac{5}{10} = \frac{13}{x}$

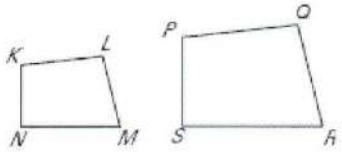
$\frac{1}{2} = \frac{13}{x}$ $x = 2 \cdot 13$

$= 26$

THEOREM 6.1:

PERIMETERS OF SIMILAR POLYGONS

If two polygons are similar, then the ratio of their perimeters is equal to the ratios of their corresponding side lengths.



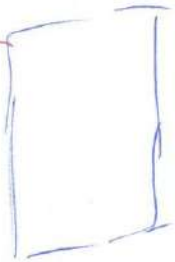
If *KLMN* ~ *PQRS*, then $\frac{KL + LM + MN + NK}{PQ + QR + RS + SP} = \frac{KL}{PQ} = \frac{LM}{QR} = \frac{MN}{RS} = \frac{NK}{SP}$.

Ex 4: Find perimeters of similar figures

Basketball A larger cement court is being poured for a basketball hoop in place of a smaller one. The court will be 20 feet wide and 25 feet long. The old court was similar in shape, but only 16 feet wide.

a. Find the scale factor of the new court to the old court.

b. Find the perimeters of the new court and the old court.

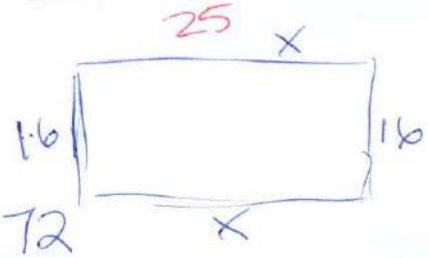


a) $\frac{20}{16} = \frac{5}{4}$

Perimeter of new Ct = 90

$\frac{90}{P} = \frac{5}{4}$

$5p = 90 \cdot 4 \quad P = 72$



Vocabulary: **CORRESPONDING LENGTHS IN SIMILAR POLYGONS**

If two polygons are similar, then the ratio of any two corresponding lengths in the polygons is equal to the scale factor of the similar polygons.

Classwork: Practice 6.3 Worksheet